



Science Mission Directorate
National Aeronautics and Space Administration

The SPoRT Center – Infusing NASA Technology Into NWS WFOs

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Earth Science Office

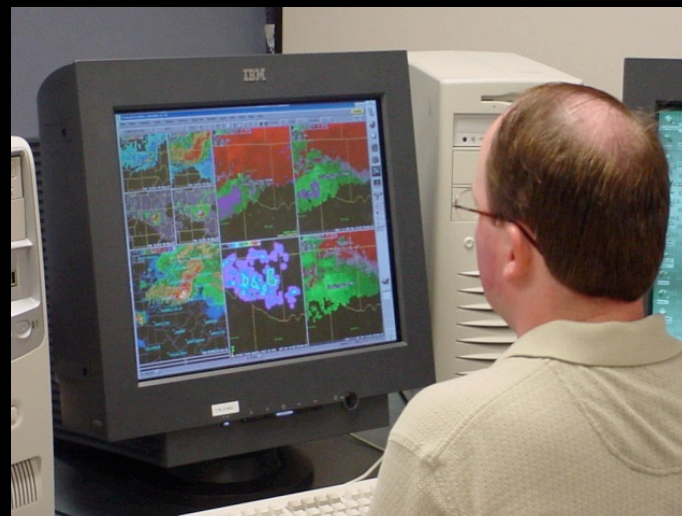
Mission of the SPoRT Center: Apply NASA measurement systems and unique Earth science research to improve the accuracy of short-term (0-24 hr) weather prediction at the regional and local scale

SPoRT website

<http://weather.msfc.nasa.gov/sport>

Collaborative Partner Blog

<http://www.nsstc.uah.edu/sportblog/>



SPoRT – Short-term Prediction and Research Transition



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How SPoRT Got Started

2001 - Launch a series of EOS satellites

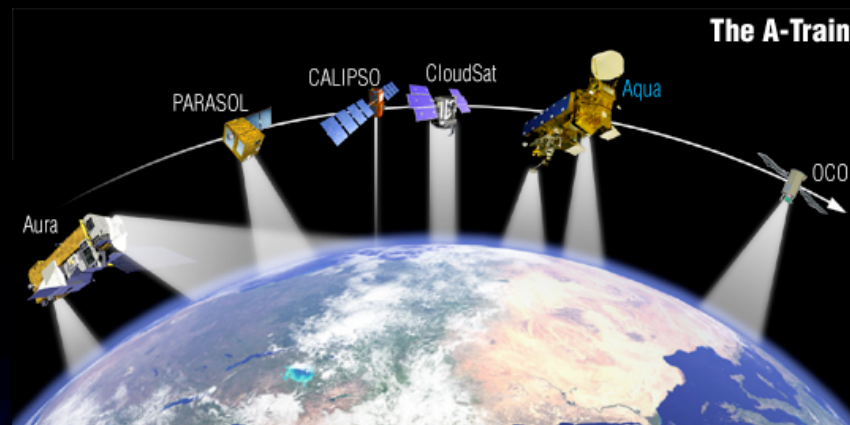
- to study the Earth's climate, monitor its changes, and to assess anthropogenic affect
- high resolution sensors which measure unique processes in the atmosphere, on the Earth, and in the oceans

2002 – MSFC proposed to demonstrate the utility of these climate instruments to observe small scale weather features often missed by NOAA weather satellites

- high resolution multispectral data complements geostationary (high temporal resolution)
- new products from additional channels
- assimilation of data into forecast models could significantly improve weather forecasts

2003 – MODIS and total lightning data in AWIPS

The NASA research instruments serve as prototypes for future NOAA sensors



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Accomplishments

- Established a working paradigm for transition of research capabilities to operations – a foot bridge over the “valley of death”
- Demonstrated key improvements to forecast problems as a result of the real-time use of NASA observed and prototype data and special assimilation procedures and modeling scenarios
- The transitioned data and products regularly improve weather diagnostic and forecast capabilities at the WFOs in the Southern Region
- Developed user advocacy for new products, many of which will become future NOAA operational capabilities
- Trained forecasters on use of new technologies
- Developed, tested and transitioned various tools to collaborative organizations for application to their transition activities

Operation Weather Community



Research Community





More than a Test Bed!

SPoRT is an end-to-end research to operations activity!

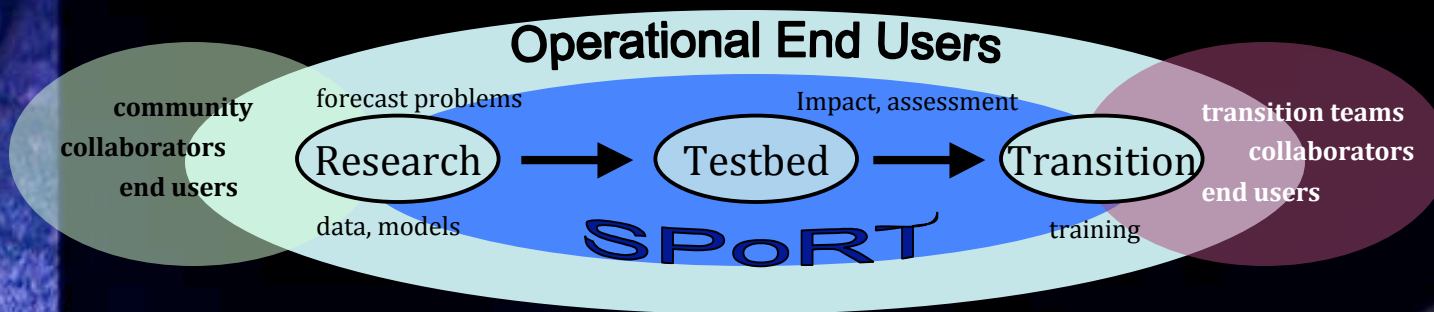
- explore cutting edge research relevant to operational weather forecasting
- work with end users to match forecast problems to capabilities / data

Demonstrate feasibility of new data / capability to address forecast problem in a simulated operational environment – this is a test bed function

- real-time data and products – timely dissemination capability
- display in operational system – visualization, interoperability with other products
- assessment and impact on forecast problem
- end user involvement critical to success

Transition of experimental data to operational environment

- mechanics of transition
- training and product impact and assessment – end user involvement



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Interactions with WFOs

Keys to success

Link data / products to forecast problems

Integrate capabilities into AWIPS

Provide training / forecaster interaction & feedback



Focused research

Exploit use of satellite observations for diagnostic analysis and nowcasting (MODIS, AMSR-E, and AIRS, total lightning products, special GOES products)

- timing and location of thunderstorms, severe weather, and precipitation
- diagnostic analysis of current conditions, cloud cover, visibility, fog, etc. (esp. at night), morning minimum temperatures (and its local variations)
- coastal weather processes (sea breeze convection / temperatures), off-shore precipitation processes
- weather in data void regions

Unique modeling configurations

- coupled WRF / LIS (satellite data to improve surface parameterizations)
- use of high resolution SST in regional models WRF, WRF NMM (EMS)

Data assimilation studies

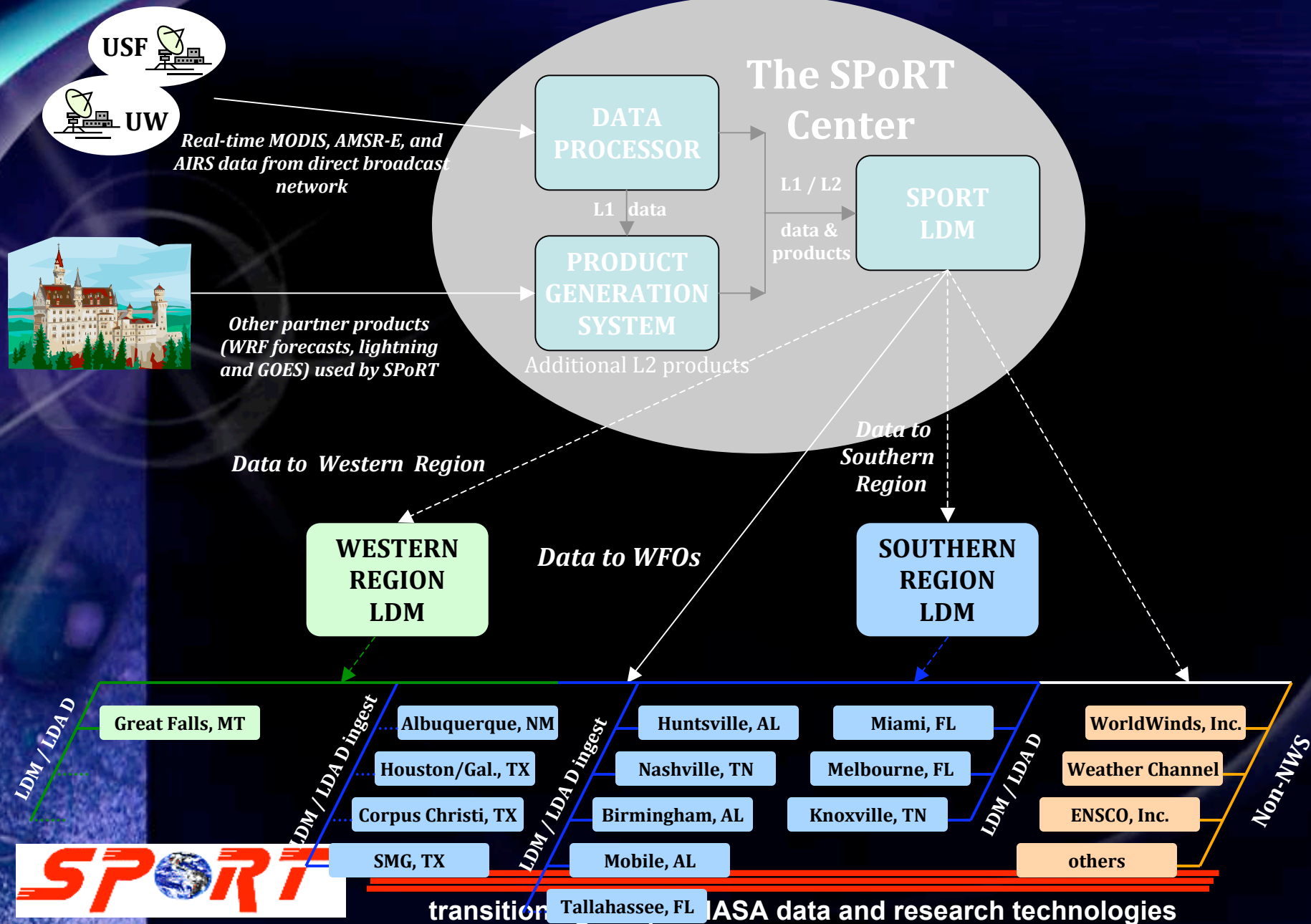
- AIRS radiances in GSI / WRF NAM
- AIRS profiles in WRF / Var



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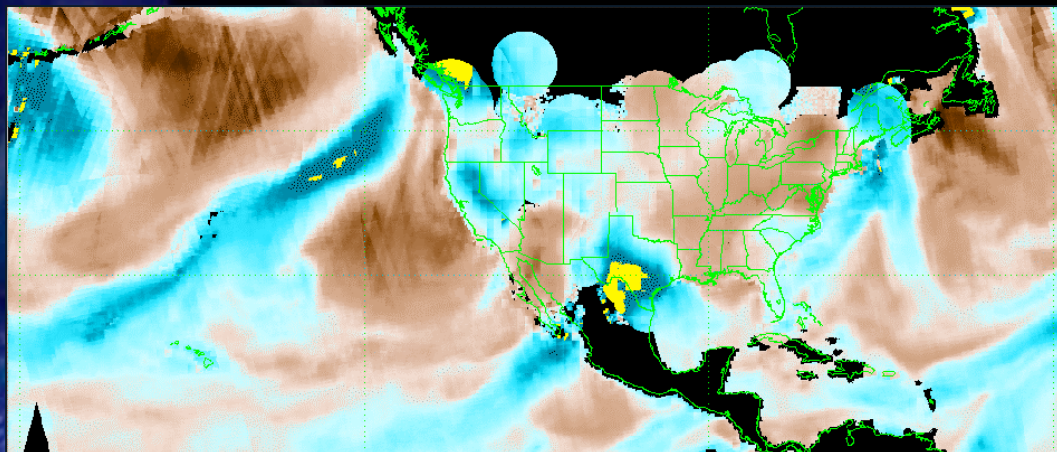
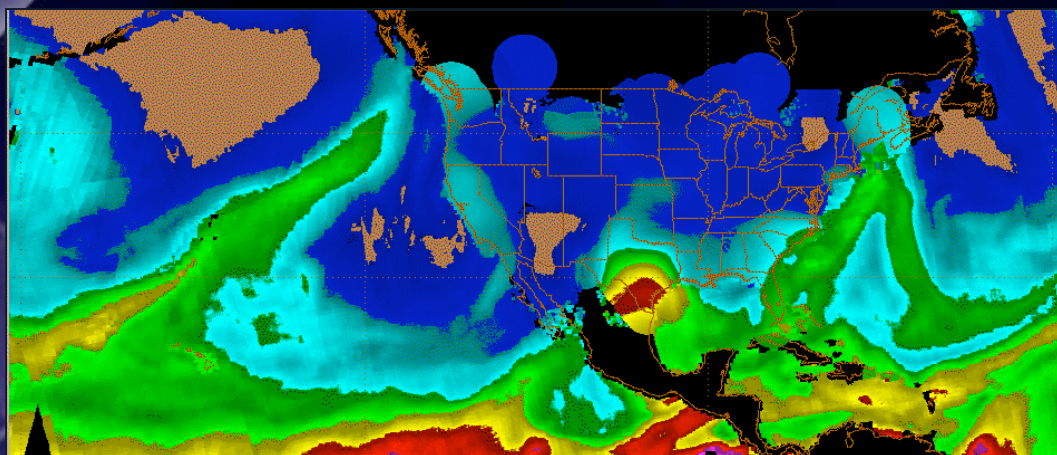
Data Dissemination Via LDM





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TPW Mapping in Data Poor Regions



Total precipitable water (TPW) and anomaly product used to monitor atmospheric rivers and moisture sources in data sparse regions (e.g., oceans, SW U.S.)

- CIRA/CSU & NESDIS
- combined SSM/I, AMSU, GPS observations
- 4 times daily
- anomaly is departure from previous week's values

Similar product now available in AWIPS



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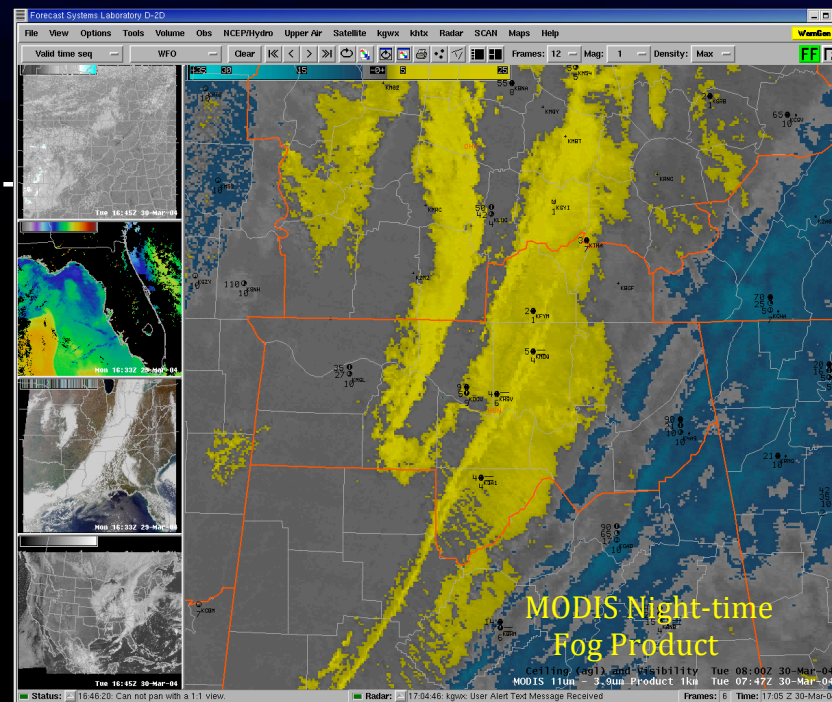
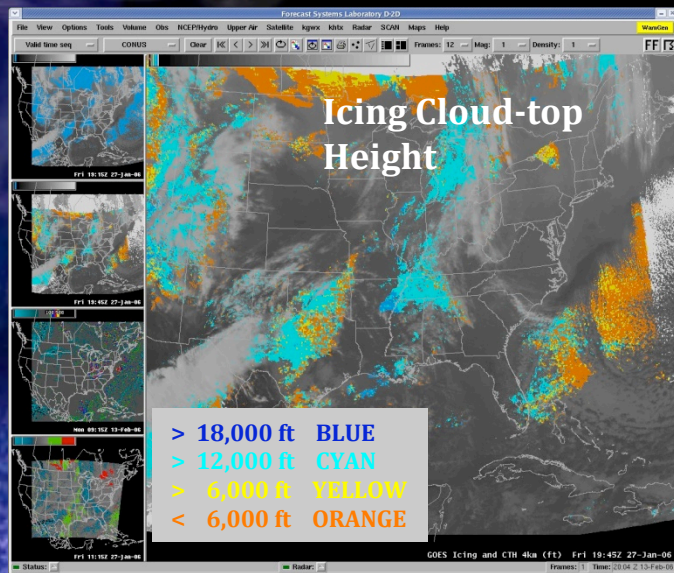


Other Products

Nowcasting Products

- convective initiation products for thunderstorm development
- flash density of total lightning (LMA) - relation to severe weather

Unique GOES aviation products in advance of AWIPS Builds



High resolution thermal channels allow for night time fog and low clouds detection which limits surface visibility.



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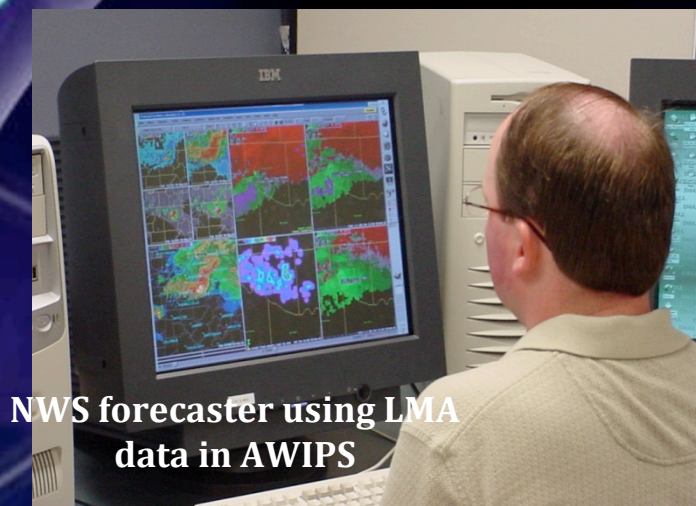
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Total Lightning Data from NASA's Lightning Mapping Array: Severe Weather Forecasting

WHY

Demonstrating utility of NASA lightning data from ground-based systems helps ensure success of future satellite measurements

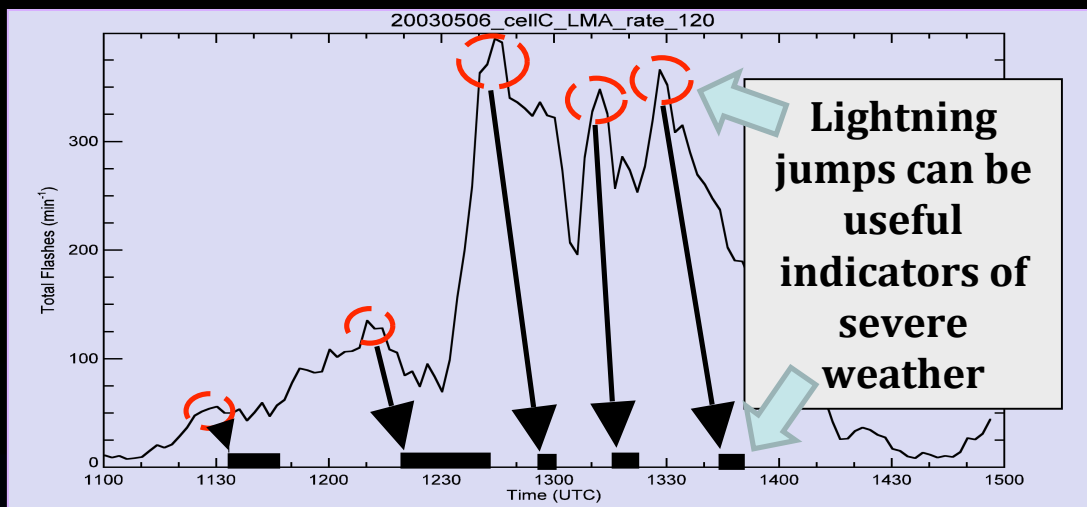
- Severe weather affects the lives of most people in U.S.
- Develop and advance the use of *NASA total lightning data* for severe weather forecasting
- Ground-based systems serve as prototypes for advanced space-based systems
- *Improved severe weather forecasts – save lives*



NWS forecaster using LMA data in AWIPS

WFO Huntsville: *"I believe the flash density rates were the primary factor in holding off on a warning."*

WFO Nashville: *"the LMA often helps 'tip the scales' towards issuing a warning"*



Large increases in total lightning prior to severe weather

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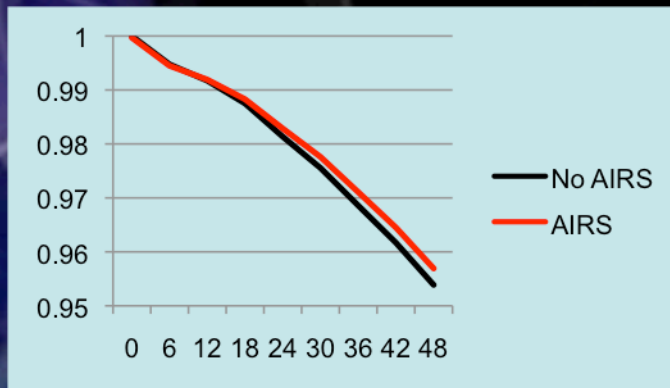
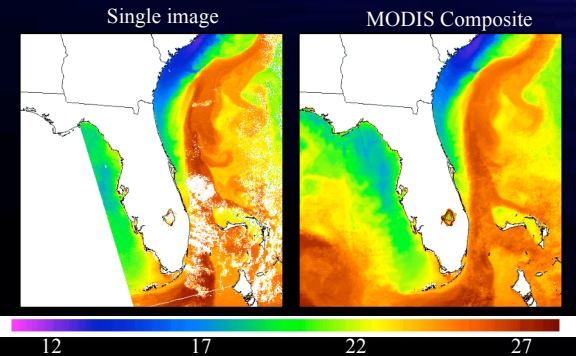




Data Assimilation and Modeling Transitions

Unique datasets

- High resolution MODIS / AMSR-E composite replaces RTG SST fields in regional forecast models leading to improved coastal weather forecasts –available to WFOs via WRF EMS, NSSL Spring Program ensembles, and daily runs

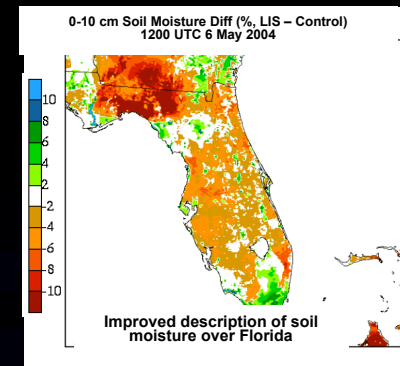


Data assimilation approaches

- Assimilating AIRS radiances in WRF (GSI) and profiles with WRFvar lead to regional forecast model improvements
- Success with profiles drives interest from others

Research model applications

- Implement coupled WRF / LIS for better characterization of regional lands surface changes from climatology – snow cover, vegetation changes





Use of Experimental Data in Operations

Must dos for SPoRT:

- Continuous interaction with end users key to success
- Understand needs, the operational environment, and forecast constraints
- Transition and implementation in AWIPS /AWIPS II environment
- Training on products
- Surveys to assess usage
- Site visits
- Monthly collaboration calls
- Collaborative blog (<http://weather.msfc.nasa.gov/sportblog>)





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The Next 5 Years

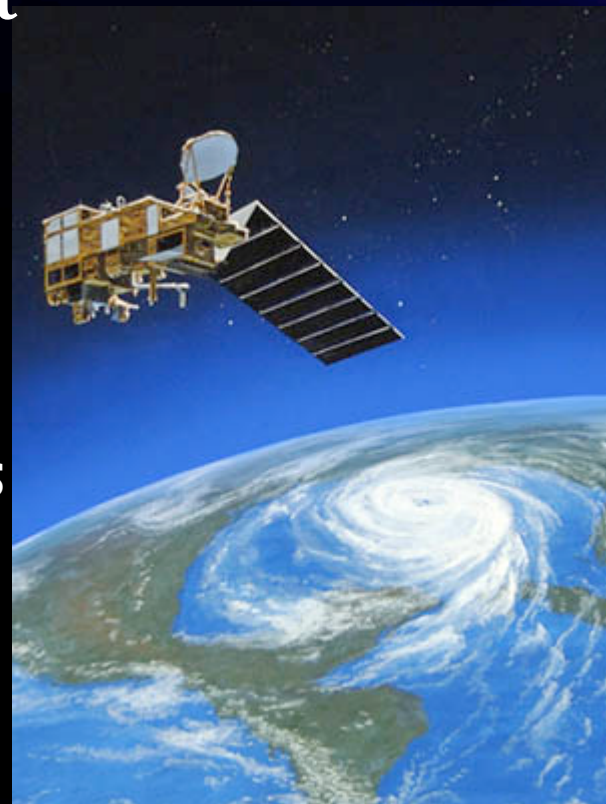
Continue to demonstrate utility of current and future NASA observations

Consider IASI in addition to AIRS

AWIPS II and NPOESS

- Transition current capabilities to AWIPS II (Fall 09)
- Demonstrate for NPP by providing VIIRS and CrIMSS data and products to WFOs

Work more collaboratively with regional centers and other testbeds (DTC, JHT, HMT, HWT, etc.)



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